to furnish general instruction to as large a number as will favour me with their attention; and also to have always round me two or three whom we may style specialists. I can only say that I now see a very fair prospect of obtaining the latter. It may be well to place on record my humble opinion, that the best preliminary training for a geographical *specialist* is sound grounding in general science, and superadded to this an elementary knowledge of history. I have found by experience that it is exceedingly hard to give the necessary scientific knowledge to an historian"—a somewhat hard saying for the historians. In the coming academical year the lectures will be on the physical geography of continents, the geography of the British Isles, and the historical geography of North America. As Extension Lecturer, Mr. Mackinder has delivered 102 lectures on geography and physiography at various towns throughout the country.

IN the August number of the *Scottish Geographical Magazine*, Mr. Forbes reports on his attempts to reach the Owen Stanley Peak, and incidentally describes the moving adventures by flood and field of his last expedition. Although not successful, owing to more than one unexpected mishap, in reaching his goal, he claims that the results accomplished so far have not been few or inconsiderable. Large additions have been made to botanical and some to zoological science; an extensive series of meteorological observations has been tabulated, and a tract of country has been mapped for the first time. Mr. Ravenstein briefly describes the recent explorations in the territories of the African Lakes Company between Nyassa and Tanganyika. Both these papers are accompanied by excellent maps. Archdeacon Maples, of the Universities Mission to Central Africa, gives a detailed account of Lukoma, the principal island in Lake Nyassa, which, although only 4½ miles long by 2½ broad, has a population of 2500, or about 220 to the square mile, in consequence of its comparative freedom from war. "Ula," or witchcraft, of the kind described by Mr. Rider Haggard with such graphic force in one of his earlier works, prevails, and is a curse to the island. Herr Metzger contributes a most interesting paper on the scientific work lately done in the Dutch East Indies, based mainly on recent Government publications and those of various learned Societies in Holland and Java.

THE current number of the *Deutsche Geographische Blätter* contains two papers of considerable geographical and ethnological interest. The first, by Herr August Fitzau, is devoted to the little-known region of the north-west African seaboard between Morocco and the Senegal River. After an historical survey of the various attempts made to found European settlements in this region, the writer describes in detail the sections of the coast between Agadir and Cape Juby, and thence to Saint Louis. He then deals with the Western Sahara in general, and especially with the ethnological relations of the regions south of the Atlas and north of the Senegal River, arriving at the general conclusion that, although Arabic has become the dominant language, the old Berber or Hamitic is still the prevailing ethnical element, variously modified by Semitic and Negro influences. In the second paper the distinguished traveller and ethnologist, Dr. O. Finsch, gives a sympathetic and permanently valuable account of the life and work of the late Mikluho-Maclay, to whom anthropological science is so much indebted for his profound studies of the Malayan, Papuan, Negrito, Melanesian, and Australian races. The memoir is very complete, including a detailed account of the naturalist's travels with their scientific results, his vast ethnological collections and the zoological stations founded by him, and concluding with a full descriptive-catalogue of his numerous geographical, anthropological, and zoological writings.

THE July number of the *Bollettino* of the Italian Geographical Society is mainly occupied with Leonardo Fea's recent explorations in Tenasserim. The chief points visited were the curious "Farm Caves" in the Moulmein district, and Mount Mulai (Moolaee) in the Dona Range. This peak, culminating point of Tenasserim (6300 feet), was reached and ascended to its summit after a journey full of difficulties and hardships, which followed the course of the Jeeayng-Myit and its great southern tributary, the Undurò, as far as Meetan in 46° N., 98° 30′ E. From Meetan the route struck north to Tagata and Mulai through the hilly territory of the little-known Ayaeen Karens. Of this tribe Signor Fea gives an interesting account, and he was also successful in securing a large zoological collection, including 450 skins of birds, over 400 mammals, many hundred reptiles, batrachians, and fishes, besides numerous insects, spiders, mollusks, and other small animals. These treasures go to enrich the valuable zoological materials already brought together in the Natural History Museum founded at Genoa by the Marquis Giacomo Doria. The paper is accompanied by a map of the region explored, as well as by several original sketches by the naturalist himself. The Marquis Doria has added a useful list of the various memoirs that have appeared in connection with Signor Fea's geographical and biological researches in Burmah during the last four years.

THE most important amongst recent explorations in Indo-China are those undertaken by the Vice-Consul for France at Luang Prabang, the capital of an outlying region of Siam of the same name, and itself situated on the Mekong. M. Pavie, the official in question, has since succeeded in reaching Tonquin from this place by two different routes, the most practicable apparently being that to the north-east along the valley of the Namseng, a tributary of the Mekong, and then across the mountains forming the watershed of the Mekong and Songkoi, or Red River of Tonquin, to the valley of Nam Tay or Black River, down which M. Pavie proceeded to Sontay and Hanoi.

AT a recent meeting of the Swedish Geographical and Anthropological Society, Baron H. von Schwerin gave an account of his late expedition to the Congo and West Africa, extending over a period of nearly two years, and undertaken at the instance of the Swedish Government. He had proceeded in a steamer as far up the Congo as Stanley Falls, and then up the Kassai, the principal tributary of the former. Next he had, in the company of his countryman, Lieut. C. Håkansson, explored the basin of the Inkissi, another tributary of the Congo, and from Banana made an excursion into the land of the Mushirongi, south of the mouth of the river, a country never hitherto visited by any European. After a journey to Angola and Mossamedes, on the west coast, a journey performed in a sailing-vessel, and extending as far north as Cape Negro, he made an excursion into the lands of Kakongo and Kabinda, situated to the north of the mouth of the Congo, which had also hitherto been considered closed to Europeans. The heat on the Congo was not so excessive as was generally imagined. A temperature above 35° C. was rare, but what were particularly enervating and exhausting were the steadiness of the high temperature and the total absence of cooling breezes, whether in the shade or at night, and, more than either, the excessive humidity of the air. He considered the climate of the Congo one of the healthiest in Africa. Finally, Dr. Schwerin gave an account of his discovery on the promontory south of the Congo River of the remains of the marble pillar raised there in 1484 by Diego Cam in commemoration of the discovery of this mighty river, and destroyed by the Dutch in the sixteenth century. The speaker also exhibited a large and valuable collection of scientific objects gathered in Africa.

NOTES ON METEORITES.

I.

THEIR FALL AND PHYSICAL CHARACTERISTICS.

A PERUSAL of the Chinese annals—which reach back to the year 644 before our era, and are still models of patient record—or of the much more irregular and less complete ones of the Western world, shows in the most definite manner that since the very commencement of human history, from time to time falls of bodies on to the earth from external space have been noticed. Biot has traced in Ma-tuan-lin the record of sixteen falls from the date before mentioned to A.D. 333.

The earliest fall recorded in Europe, however, transcends in antiquity anything the Chinese can claim, dating as it does from 1478 B.C. It happened in Crete, but the record is much more doubtful than that of the falls in 705 and 654 B.C., noted, the first by Plutarch, and the second by Livy.

But in 466 B.C. occurred a fall at Aegos Potamos, in Thrace, concerning which the Chronicles of the Parian marbles, Plutarch, and Pliny all give us information. It was of the size of two mill-stones, and equal in weight to a full waggon-load.[1] Later, there fell in Phrygia, in about the year 2[illegible]4 B.C., a stone famous through long ages, which was preserved there for many generations. It was described as "a black stone, in the figure of a cone, circular below and ending in an apex above." It was worshipped by the ancients as Cybele, the mother of the gods, and was transferred to Rome, as an oracle had announced that the possession of it would secure continual prosperity to the State.[1]

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[1] Humboldt, "Cosmos," Otté's translation, vol. i. p. 103.

In more modern times we have records of various falls of these bodies. The following—a few out of a very great number—either possess a national interest or are the statements of eye-witnesses.

In England there fell a stone in the afternoon of December 13, 1795. A labourer happened to be working near Wold Cottage, Thwing, Yorkshire, when this stone fell within a few yards of him. On digging the stone out of the ground it was found to have penetrated a foot of soil and half a foot of chalk rock, and to weigh 56 pounds. The inhabitants of the neighbouring villages likened the explosion to the firing of guns at sea, while in two of them the sounds were so distinct of something rushing through the air towards Wold Cottage that some of the people went to see if anything extraordinary had happened.

The next account is from Ireland. It is the narrative of an eye-witness of a fall of meteorites in the county of Limerick.

"Friday morning, the 10th of September, 1813, being very calm and serene, and the sky clear, about 9 o'clock, a cloud appeared in the east, and very soon after I heard eleven distinct reports appearing to proceed thence, somewhat resembling the discharge of heavy artillery. Immediately after this followed a considerable noise not unlike the beating of a large drum, which was succeeded by an uproar resembling the continued discharge of musketry in line. The sky above the place whence this noise appeared to issue became darkened and very much disturbed, making a hissing noise, and from thence appeared to issue with great violence different masses of matter, which directed their course with great velocity in a horizontal direction towards the west. One of these was observed to descend; it fell to the earth, and sank into it more than a foot and a half, on the lands of Scagh, in the neighbourhood of Patrick's Well, in the county of Limerick. It was immediately dug up, and I have been informed by those that were present, and on whom I could rely, that it was then warm and had a sulphurous smell. It weighed about 17 pounds, and had no appearance of having been fractured in any part, for the whole of its surface was uniformly smooth and black, as if affected by sulphur or gunpowder. Six or seven more of the same kind of masses, but smaller, and fractured, as if shattered from each other or from larger ones, descended at the same time with great velocity in different places between the lands of Scagh and the village of Adare. One more very large mass passed with great rapidity and considerable noise at a small distance from me; it came to the ground on the lands of Brasky, and penetrated a very hard and dry earth about 2 feet. This was not taken up for two days; it appeared to be fractured in many places, and weighed about 65 pounds! Its shape was rather round, but irregular. It cannot be ascertained whether the small fragments which came down at the same time corresponded with the fractures of this large stone in shape or number, but the unfractured part of the surface has the same appearance as the one first mentioned. There fell also at the same time, on the lands of Faha, another stone, which does not appear to have been part of or separated from any other mass; its skin is smooth and blackish, of the same appearance with the first-mentioned; it weighed about 74 pounds; its shape was very irregular, for its volume was very heavy. . . . . . It was about three miles in a direct line from the lands of Brasky, where the very large stone descended, to the place where the small ones fell in Adare, and all the others fell intermediately; but they appeared to descend horizontally, and as if discharged from a bomb and scattered in the air."[2]

The fall of the meteorite of 1885, near Mazapil, in Mexico, was thus described by an eye-witness vouched for by Prof. Bonilla:—[3]

"It was about nine in the evening when I went to the corral to feed certain horses, when suddenly I heard a loud hissing noise, exactly as though something red hot was being plunged into cold water, and almost instantly there followed a somewhat loud thud. At once the corral was covered with a phosphorescent light and suspended in the air were small luminous sparks as though from a rocket. I had not recovered from my surprise when I saw this luminous air disappear, and there remained on the ground only such a light as is made when a match is rubbed. A number of people from the neighbouring houses came running toward me, and they assisted me to quiet the horses, which had become very much excited. We all asked each other what could be the matter, and we were afraid to walk in the corral for fear of getting burned. When, in a few moments, we had recovered from our surprise, we saw the phosphorescent light disappear, little by little, and when we had brought lights to look for the cause, we found a hole in the ground and in it a ball of fire. We retired to a distance, fearing it would explode and harm us. Looking up to the sky we saw from time to time exhalations or stars,[1] which soon went out, but without noise. We returned after a little, and found in the hole a hot stone, which we could barely handle, which on the next day we saw looked like a piece of iron; all night it rained stars, but we saw none fall to the ground, as they seemed to be extinguished while still very high up."

The next record of the phenomena attending a fall in the United States (though the observer quoted did not actually see the fall) is taken from a lecture by Prof. Newton:—[2]

"'The observers,' he says, 'who stood near to the line of the meteor's flight, were quite overcome with fear, as it seemed to come down upon them with a rapid increase of size and brilliancy, many of them wishing for a place of safety, but not having the time to seek one. In this fright the animals took a part, horses shying, rearing, and plunging to get away, and dogs retreating and barking with signs of fear. The meteor gave out several marked flashes in its course, one more noticeable than the rest. . . . Thin clouds of smoke and vapour followed in the track of the meteor. . . . From one and a half to two minutes after the dazzling, terrifying, and swiftly moving mass of light had extinguished itself in five sharp flashes, five quickly recurring reports were heard. The volume of sound was so great that the reverberations seemed to shake the earth to its foundations; buildings quaked and rattled, and the furniture that they contained jarred about as if shaken by an earthquake; in fact, many believed that an earthquake was in progress. Quickly succeeding, and blended with the explosions, came hollow bellowings and rattling sounds, mingled with clang, and clash, and roar, that rolled away southward, as if a tornado of fearful power was retreating upon the meteor's path.'

"About 800 pounds of stones, nearly 200 in number, have been picked up in a region seven miles by four, a little east of the end of the meteor's path, which without any doubt came from the meteor. Some were picked up on the surface of the frozen ground. One was found on the top of a snow-bank, and about 40 feet away were marks of a place where it had first struck the ground. Some were ploughed up in the spring. The two largest found, of 74 pounds and 48 pounds, fell by the roadside, and a lawsuit to settle whether they were the property of the finder as being wild game, or of the owner of the lands adjacent as being real estate, was decided in favour of the owner of the land."

In some cases of observed falls the rate of movement of the meteorite through the air has been determined, or concomitant circumstances have enabled it to be roughly estimated.

The velocities have been widely different. Before they are stated, some terms of comparison may be given:—

		Metres per second	Miles an hour.
Railway trains		27 nearly	60
Flight of swallow		30 to 40	67 to 92
Projectiles		300 to 400	670 to 920
Sound		335⅓ nearly	750
Mercury	Movement in Orbit	48,900	109,358
Venus		36,780	83 162
Earth		30,430	68,052
Mars		24,650	55,135·5

The highest velocity of flight through the air has been that of the Stannern meteorites, 45 miles a second. The lower part of the flight of the Iowa meteorite was performed at 12 miles a second.

In only a few cases have the velocities been observed to be very great at the earth's surface, the retarding effect of the passage through the atmosphere being considerable. Some have buried themselves deeply in the ground, and one (New Concord) broke a railway-sleeper. Several meteorites have fallen so rapidly that the sound of the explosion *followed* them. But generally the rate is so slow that they are not broken on striking the surface, and some that fell at Hessle on ice only rebounded without cracking it.

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[1] See British Museum Introduction to the Study of Meteorites, p. 17.

[2] Quoted by Maskelyne, "Lecture Notes on Meteorites," NATURE, 1875, vol xii. p. 485.

[3] NATURE, vol. xxxv. p. 572.

[1] The meteor fell during a star-shower.

[2] NATURE, vol. xix. p. 315.

These bodies, when they fall under such conditions that they can be picked up and examined, are called meteorites. The first thing that strikes one when looking for the first time at these meteorites, is that their general form has the character of being essentially fragmentary, indicating that what we see is the result of a fracture.

The next point observed is that there is a very great difference between the interior and exterior appearances of these bodies. That this is caused by the heat and friction to which the exterior surface is exposed is proved by what was noticed in the case of a meteorite that fell at Butsura in 1861. Fragments of this stone were picked up three or four miles apart, and, with the exception of one corner, the original meteorite has been built up again by piecing the fragments together. The faces fit perfectly. Important pieces of this meteorite are in the British Museum, and these are all coated with the crust to which reference has been made. But, on the other hand, another of these fragments *not coated* fits another also not coated. Hence, to quote Prof. Maskelyne, "We can assert that this aërolite acquired, after coming into our atmosphere, a scoriated and blackened surface on incrustation. The first explosion drove the fragments first alluded to asunder, and these became at once incrusted on their broken surfaces; but others which were separated afterwards, probably on the last of the three explosions, had not sufficient velocity left [the heat being at the same time reduced] to cause their incrustation in the same manner as was the case with the fragments previously severed."[1]

The supposition is that the temperature is practically high enough to melt the meteorite, and that its surface as we see it after it has fallen does not in all cases represent the surface exposed to the air during the whole of the flight, but that it represents the last surface. The meteorite may have been twenty times bigger, but the rest may have been melted off like tallow would be, so that finally there is very little visible effect towards the interior, as the melting is more rapid than the conduction. The thinness of the so called varnish, then, is caused by the air-molecules carrying away the results of fusion as fast as the heat penetrates towards the interior, so leaving only, as a rule, a very thin film behind.

This crust is usually dull, but sometimes, as in the Stannern meteorite, bright and shining, like a coating of black varnish.

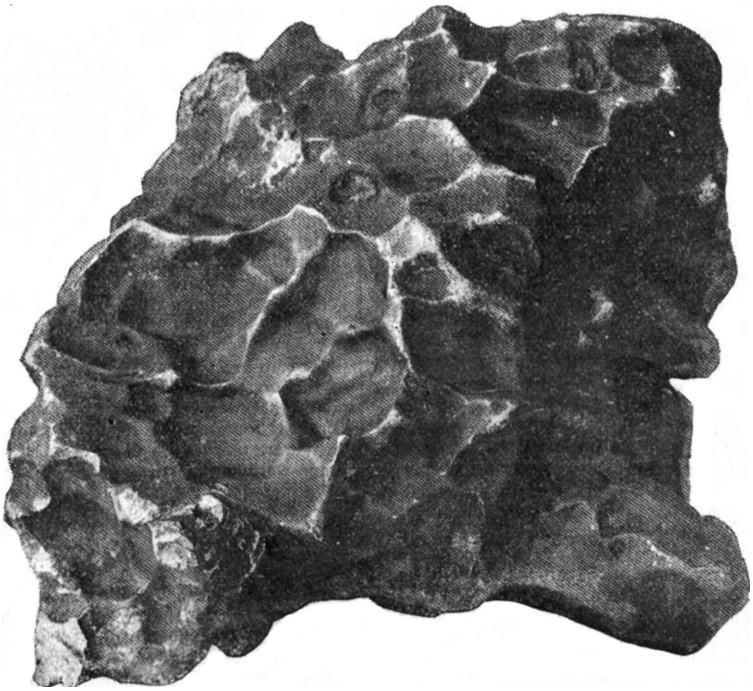

FIG. 1.—Mazapil Meteoric Iron (¾ natural size), showing thumb-marks.

Sorby,[1] on examining with a microscope a thin section of a meteorite, cut perpendicular to the crust, found that it is a true black glass filled with small bubbles, and that the contrast between it and the main mass of the meteorite is as complete as possible, the junction between them being sharply defined, except when portions have been injected a short distance between the crystals. He writes:—"We thus have a most complete proof of the conclusion that the black crust was due to the true igneous fusion of the surface under conditions which had little or no influence at a greater depth than 1/100 of an inch. In the case of meteorites of different chemical composition, the black crust has not retained a true glassy character, and is sometimes 1/50 of an inch in thickness, consisting of two very distinct layers, the internal showing particles of iron which have been neither melted nor oxidized, and the external showing that they have been oxidized and the oxide melted up with the surrounding stony matter. Taking everything into consideration, the microscopical structure of the crust agrees perfectly well with the explanation usually adopted, but rejected by some authors, that it was formed by the fusion of the external surface, and was due to the very rapid heating which takes place when a body moving with planetary velocity rushes into the earth's atmosphere—a heating so rapid that the surface is melted before the heat has time to penetrate beyond a very short distance into the interior of the mass."

In some cases close under the crust is found a mixture of the minerals troilite, asmanite, and bronzite, of an unaltered light-brown colour, although they turn deep black when raised to a temperature slightly above that at which lead melts.[2]

The crust or varnish of the meteorite in many cases contains numerous furrows and ridges, so that it is not equally thick. This effect is caused, as it is supposed, by its motion through the air in a fixed position, the forward part of the meteorite, in regard to its line of motion, being most liquefied, and the liquid flowing unequally towards the hinder part.

A very special study of the results of the passage through the air is a desideratum. Thus, in the case of the Tennessee iron, which fell from a cloudless sky (and which therefore fell with a low velocity?), the outer surface is elaborately reticulated, edges of thin laminæ of metal inclined at angles of 60° traversing it. Hence no fusion of the superficial layer took place.[1]

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[1] "On the Structure and Origin of Meteorites," NATURE, vol. xv. p. 495.

[1] "Lecture Notes," *loc. cit.* p. 487.

[2] Flight, "History of Meteorites," p. 169.

Another peculiarity of the surface is that it is generally covered with small depressions called "thumb-marks," as they have been likened to the impressions that one makes when pressing some such substance as putty with one's fingers. The cause of these thumb-marks is unknown, but they have been found to bear a close resemblance to marks which have been noticed on grains of gunpowder blown out on firing large guns.

A possible cause of these pittings is thus suggested by Prof. Maskelyne:—"The aërolite comes into our atmosphere from regions in which the temperature—'the cold of space'—may range as low as 140° C. below zero; and though the mass, from the absorption of solar heat, would possess a temperature much above this, it would nevertheless be intensely cold, and consequently more brittle than at ordinary temperatures; and hence, on its entering our atmosphere, the heat it instantaneously acquires on its outer portion expands this, and tends to tear it away, so as to dissever the exterior from the interior, which continues to be relatively contracted by the intensity of the cold which the aërolite brings with it from space. The consequence is, first, that little bits of the stone spring out all over it, leaving those curious little holes or pit-marks which are characteristic of a meteorite; and every now and then, as the heat penetrates, larger masses split away, of which interesting evidence is afforded by the meteorite, for instance, that fell at Butsura on May 12, 1861."

On this it may be remarked that the pittings are common to irons and stones, while the above explanation only applies to stones.

It is not a little worthy of notice that the pitting does not always appear on all the surfaces. In the case of a meteorite which fell in Kentucky in 1877, one portion of it is very extensively and regularly pitted, while the rest is comparatively smooth. The crust is dull black, and is as perfect as when the stone fell. There was a fresh broken spot of two or three square centimetres, which was evidently made prior to the fall, for a few small specks of the melted matter adhered to the surface.[2]

These meteorites, which we can thus examine, are in all probability, for the most part, remnants of larger bodies which had enough substance in them to stand the wear and tear of getting through our atmosphere.

The fragments picked up even from the most extensive falls have appeared to those who have witnessed or who have subsequently studied the phenomena to be out of all proportion small to the violence and magnitude of the explosive and luminous effects observed.

The origin of the concomitant phenomena so universally recorded is not far to seek.

Supposing a meteorite passing towards the earth through the atmosphere, what sort of effects are we to expect to find? It passes, as we have already seen, very rapidly into the earth's atmosphere, which consists of molecules with a certain mean free path, and the temperature and pressure of which depend upon the encounters between these molecules.

When we come to consider the general velocity of movement of these molecules, we find that the big molecule, the meteorite, is travelling towards the earth about fifty times faster. The result is that there is a tremendous crowding of air, so to speak, in front of the meteorite, a tremendous pressure and therefore a tremendous temperature brought about by its passage. There is a partial vacuum behind which subsequently has to be filled up by the transit of the molecules round the meteorite itself from the front part to the back.

We have therefore conditions for producing most violent action upon the meteorite, both by pressure and temperature; it may be crushed by the pressure to which it is subjected, it may be melted by the heat produced by the circulation of the molecules rushing past it. We may therefore have violent incandescence and explosion, and as we have the air molecules rushing violently from front to rear we shall have almost the noise of a thunderstorm added to the sudden luminosity resembling lightning.

The observers of actual falls have heard other special noises, due, not to the explosion itself, but to the rapid passage of the meteorites through the air, from the "ping" of a rifle bullet to the hum of a locomotive, sounds which have been likened to the tearing of linen, the lowing of cattle, the flapping of wings.

We can best study the differences in the structure of meteorites by preparing a polished section. In some cases this has a distinctly metallic look. We find, in fact, a metallic fragment composed almost entirely of iron, but with a certain amount of nickel.

The nickel in the iron meteorites causes them to have a whitish appearance, and it is in this way that they have been mistaken for silver when found, the nickel preventing the outer surfaces from rusting as is the case with an ordinary iron.

By taking a polished section, and exposing it to the action of an acid or bromine, we obtain what have been called the "figures of Widmanstätten." These figures are more or less complicated, and remarkable for their extreme regularity. They are due to the inequality of the action of the acid on the various constituants of the polished surface; these being various alloys of iron and nickel.

In other specimens the characteristic is that the metal, instead of being continuous as in those previously referred to, appears to have existed once as a spongy paste, and to have included fragments of stony matter, so that in the section, instead of getting the pure metallic lustre all along, we only get it here and there. We pass from metal to metal *plus* stone.

In yet other specimens we get another generic case represented in which the stone is the main point and the metal the exception, the metal appearing as excessively small granules; so that in the final term of the series we come to almost pure stone with no iron to speak of.

In the case of the stones, not only does the meteorite itself give the idea of a fragment, as in the case of the irons, but the internal structure of many of them shows that the whole meteorite is composed of fragments, giving the characteristics of a brecciated rock made up of pieces cemented together.

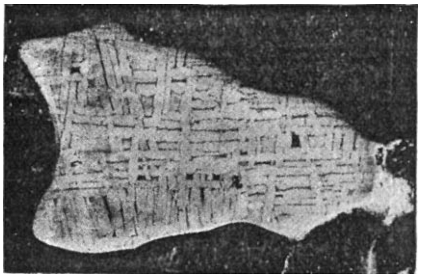

FIG 2.—Section of Mazapil Meteoric Iron (natural size), showing Widmanstätten figures.

Further, these constituent particles, as pointed out by Sorby, are often themselves mere fragments, although the entire body before being broken may originally have been only one fortieth or one-fiftieth of an inch in diameter.

On examining thin sections of stony meteorites by means of polarized light, they are found to be crystallized throughout, the interference tints colouring the different crystals of which the sections are composed, thus showing the crystalline character of the whole. The stony part of both siderolites and aërolites is almost entirely crystalline, and presents a peculiar "chondritic" structure, which make meteorites differ from ordinary terrestrial rocks; the loose grains in these are found to be more or less aggregated in little spherules, and of similar mineral to those which inclose them.

These spherules, or chondroi—their sizes varying very considerably, some of which can be seen only under a microscope, while others are as large as a cherry—are found embedded in a matrix, made up, as it appears, of minute splinters such as would result from the disintegration of other chondroi.

While the chondroi in terrestrial rocks such as perlite, obsidian, pitchstone, and in many diorites, are radiate-fibrous, those occurring in meteorites are but rarely so, and the arrangement of the fibres within the spherule is eccentric. While the meteoritic chondroi also consist of the same ingredients as the matrix, and often differ from it only in being more coarsely granular, the chondroi of terrestrial rocks are differently constituted from the matrix.[1]

The weight of meteorites varies very considerably, ranging from tons to very small specimens. It not only depends on their volume but on their chemical composition, as some of the stony ones have a low density while others are nearly pure metal.

The largest meteorites of which mention is made are those of Otumpa (province of Tucuman, South America), an iron weighing thirty tons; of Durango (Mexico), nineteen tons; and of Cranbourne, Australia (now in the British Museum), which weighs over three tons.

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[1] Flight. *op. cit.* p. 108.

[2] *Ibid.* p. 200.

[1] *Ibid.* p. 141.

The Nejed iron, the largest which has been seen to fall, weighs nearly 130 pounds.

Considering the very considerable number of falls which have taken place, the number of irons which have been *seen to fall* is remarkably small. They are as follows:—

Agram, 1751.
Tennessee, 1835.
Braunau, 1847.
Victoria West (South Africa) 1862.
Nejed, 1863.
Nidigullam (Madras) 1870.
Rowton, Shropshire, 1876.
Mazapil, 1885.
Cabin Creek, 1886.

The following table contains a list of some of the larger meteorites, besides those mentioned above, which have been found from time to time, with the locality of their fall and their weights in grammes (1000 grammes = 2·2 pounds avoirdupois (nearly), and 1,018,181 grammes (nearly) = 1 ton):—

	Weight in grammes.
Siderites—	
Bahia, Brazil...	6,350,000
Charcas, Mexico	780,000
Tucuman, Argentine Republic, South America	637,000
The Butcher Iron, Desert of Bolson de Mapimi, Mexico	253,632
Toluca Valley, Mexico	91,007
Cocke County (Cosby's Creek), Tennessee, U.S.A.	52,325
Rancho de la Pila, nine leagues east of Durango, Mexico	46,512
Obernkirchen, near Bückeburg, Germany ...	35,366
Carthage, Smith County, Tennessee, U.S.A.	24,570
Siderolites—	
Imilac, Desert of Alacama, South America ...	227,328
Estherville, Emmet County, Iowa, U.S.A. ...	116,487
Aërolites—	
Wold Cottage, Thwing, Yorkshire	20,111
Pultusk, Poland	18,007
Butsura (Qutahar Bazaar), Bengal, India ...	13,071
Knyahinya, near Nagy Berezna, Hungary ...	13,053
Durala, N.W. of Kurnal, Punjab, India ...	12,588
Dhurmsala, Kangra, Punjab, India	12,407
Nellore (Yatoor), Madras, India	11,287

Classification of Meteorites.

Meteorites have been arranged into three classes: first, masses of iron alloyed with nickel, which have been called by Maskelyne, aero-siderites (*aer*, air, and *sideros*, iron) or briefly siderites; secondly, those which are almost wholly composed of stone, and called aërolites (*aer*, air, and *lithos*, stone); and, thirdly, those which are composed of stone and iron in more or less equal quantities, consisting of a spongy mass of iron interlaced with stony matter like that of the aërolites, and called siderolites or meso-siderites.

M. Daubrée's general classification of meteorites is as follows:—

Meteorites	Containing metallic iron	Not containing stony matter	... ...	Holosidères
		Containing iron with stony matter	The iron constituting a matrix which encases stony grains	Syssidères
			The iron existing in the form of grains among stony matter	Sporadosidères
	Not containing metallic iron		.. ..	Asidères

This brings us to consider the chemistry of these messengers from the celestial spaces.

J. NORMAN LOCKYER.

(*To be continued.*)

THE GLASGOW AND WEST OF SCOTLAND TECHNICAL COLLEGE.

At the present time, when so much is being said and done in connection with technical education, and so many new institutions are being founded, it may interest the readers of NATURE to learn how some old ones have been reorganized to enable them more adequately to meet the requirements of the times. The Glasgow and West of Scotland Technical College was founded by an Order of the Queen in Council, dated November 26, 1886, according to a scheme framed by the Commissioners appointed under the provisions of the Educational Endowments (Scotland) Act, 1882, whereby Anderson's College, the Young Chair of Technical Chemistry in connection with Anderson's College, the College of Science and Arts, Allan Glen's Institution, and the Atkinson Institution, were placed under the management of one governing body. A considerable amount of interest is attached to the histories of these institutions, of which a few of the chief dates may be mentioned.

Anderson's College was founded by John Anderson, M.A., F.R.S., Professor of Natural Philosophy in the University of Glasgow, who, by his will, dated May 7, 1795, bequeathed the whole of his property, with a few trifling exceptions, "to the public for the good of mankind and the improvement of science, in an institution to be denominated 'Anderson's University,' and to be managed by eighty-one trustees." The endowment included a general museum, library, and valuable philosophical apparatus; and the intention of the founder was to provide a complete circle of liberal and scientific education suitable for all classes, and adapted to the wants and circumstances of the period, but the design was never fully carried out. The Andersonian Institution or University was incorporated on June 9, 1796, and it has numbered among its Professors some distinguished men. Of these may be named Dr. Garnett, Dr. George Birkbeck, Dr. Andrew Ure, and Thomas Graham, who afterwards became Master of the Mint. The Medical School attained considerable importance, attracting students from all parts of the country, and sending forth a number of medical practitioners—many of whom have attained to eminence, and a few to great distinction, in their profession. On the foundation of the Glasgow and West of Scotland Technical College, the Medical School of Anderson's College was placed under a separate governing body, and provision is being made for its removal to other buildings.

In the year 1870, Dr. James Young, of Kelly and Durris, settled in trust the sum of £10,500 for the purpose of establishing a Chair of Technical Chemistry, to be called "The Young Chair of Technical Chemistry in connection with Anderson's University;" and on the organization of the Glasgow and West of Scotland Technical College, Dr. Young's testamentary trustees conveyed to the governors of the College the Young Laboratory Buildings, situated in John Street, Glasgow. Various other endowments were given at different times to Anderson's University. In 1861, Mr. John Freeland, residing at Nice, mortified the sum of £7500 to secure the delivery, annually or periodically, of "separate courses of popular lectures on the three following subjects, or any one of them, namely (1) Chemistry; (2) Mechanical and Experimental Physics; and (3) Anatomy and Physiology," and in 1871 he made a further gift of £5000 to the University. In 1866, Mr. William Euing, insurance broker in Glasgow, settled in trust the sum of £3000 for the purpose of securing the delivery of courses of popular lectures in Anderson's University upon the history and theory of music, and upon the lives of eminent musicians; and also upon such branches of acoustics as may be connected with and illustrate the science and practice of music. By his will he bequeathed his whole musical library to the University, along with £1000 for the purpose of building a fire-proof room for its accommodation, besides the sum of £200 to print a catalogue. Mr. Euing also left the University the sum of £6000 for general purposes; and £150, the interest of which is to be applied in providing prizes in connection with the Lectureship on Music instituted by him. In 1876, through the liberality of a few friends, a Chair of Applied Mechanics, with a suitable endowment, was founded.

The College of Science and Arts was the direct successor of the Mechanics' Institution, which owed its origin to the popular lectures begun in 1800 by Dr. Birkbeck in Anderson's University, and continued by his successor. In 1823 a number of students attending these mechanics' classes resolved to sever their connection with Anderson's University, and thereafter